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Management Services in Government is now on general sale as an HMSO publication and the attention of readers is invited to the information set out on the page opposite.

Training Top Civil Servants for the Computer Age

D W CROISDALE, Civil Service Department

This article is an abridged and edited version of a Haldane prize-winning essay. It was prompted partly by work done by the author for the International Institute of Administrative Sciences (IIAS), Brussels, and expresses his personal views. —*Editor.*

Introduction

In 1976 the International Institute of Administrative Sciences (IIAS) became interested in the training of senior administrators as part of some wider work on 'informatics'—an anglicised French word which encompasses the whole science, craft and art of using computers for information processing. The wider study had recognised that there had been a decided shift in the location of command within administrative organisations as a consequence of the growth in the use of computers and the emergence of their attendant specialists. There was a feeling that this was prejudicial to sound administration because the computer specialists were unduly influenced by their own technological interests.

Seemingly, administrators had not established for themselves a proper working relationship with the computer specialists. Too often the administrator had abdicated his responsibility to the specialist. This mattered little when computers were used for simple clerical tasks and could be regarded as separate identifiable divisions of administrative processes. But today computers are casting their influence in a greater variety of ways—from simple devices based upon cheap microcomputers to complex mainframe systems with extensive communications networks.

One conclusion which emerged from the IIAS study was that there was a need for a senior person—call him 'the systems architect'—to collaborate with the senior administrator. Interesting also was the common view that although the systems architect may well emerge from computer specialists for the next few years, in the long term he ought preferably to be a generalist. There is a lot of truth in the opinion that specialists should be on tap, not on top!

The title of this article begs three questions. Who are top civil servants? Are they administrators or managers? What is their role in the computer age—especially in their relationship with computer specialists? So although the aim is to arrive at curricula suggestions, the most important part will be concerned with answering these questions, since otherwise the value of any training scheme must be in doubt and the outcome largely a matter of chance, not design.

We need firstly to define the population of top civil servants, then to consider the nature of their work, their roles in relation to computer specialists and, finally, their training needs.

Top civil servants

Top civil servants are those who occupy posts in what is called the 'open structure' of the Civil Service. The majority of these will have started their careers as Executive Officers or Administration Trainees. There are about 750 of them. One can only guess how many of them ought to have the kind of training to be described in this article. As there are about 140 major administrative computers at work in the Civil Service, it is not unreasonable to assume that there should be for each such computer one top civil servant with responsibility and accountability for its use. So about one-fifth of them ought to have the kind of training proposed.

In addition there are some 6,000 civil servants in the grades from Principal to Assistant Secretary, and it seems desirable to train a number of these in readiness for their promotion to the 'open structure'. Currently the bulk of these will have had little more than a simple 'appreciation' type computer course.

But what of the rising generation of senior civil servants? Most of the top posts will be filled by those recruited and trained as Administration Trainees. Recently about 100–200 have been recruited each year and virtually all have received 20 weeks of full-time training at the Civil Service College in the early years of their service; *Table 1* analyses the College training by 'subjects'. Very little of it directly relates to computers and their use in administrative systems. Almost nothing is said about the roles of senior administrators and senior managers *vis-a-vis* the computer.

Table 1—Training of Administration Trainees

Number of hours per course

	Hours
Statistics and numeracy	70
Economics	150
Law	35
Public administration	85
Personnel management	85
Financial management	85
Policy studies	170
Total	680

A disturbing fact is that there is apparently no perceived need by top civil servants for any more training, especially if it is to last more than a few days. There is an air of complacency not justified by reports

such as the *Longer Term Review of Administrative Computing in Central Government*[1] which, although concentrating on specialist staffing needs, highlights the need for more senior staff to play bigger roles in the application of computers to administrative work. Computers are too dangerous to be left in the hands of specialists!

The reason for this apparent absence of a perceived need for more extensive training is a matter for speculation. Some of the more likely hypotheses are: it stems partly from the confusion between the roles of an 'administrator' and those of a 'manager'; partly from a lack of a professional approach to management which in turn may be a consequence of the cultural and educational backgrounds of senior civil servants; partly from career patterns which at senior levels result in changes every two to three years (to produce specialist generalists, so to speak); partly because 'management' has not got parity of esteem with 'administration', which in turn may stem from national cultural influences; partly because administrative rather than managerial expertise is needed for the very top posts. Before the question of more training is examined the nature of administration and management must be examined. Are they one and the same thing?

Administration and management

> 'The question is,' said Alice, 'whether you can make words mean so many different things.'
>
> 'The question is,' said Humpty Dumpty, 'which is to be the master—that's all.'
>
> (Lewis Carroll, *Alice Through the Looking Glass*)

The use of the word management in connection with public administration is relatively recent[2] and appears to have originated in the USA. The era of management in the public service in the USA is thought to date from 1937 when the Brownlow Committee reported on what it described as 'administrative management'. In the United Kingdom Civil Service management officially arrived with the publication of a Treasury Circular in June 1957, which mildly admonished administrators for not being sufficiently alive to the great responsibility which they should carry in management matters. But it was the Plowden Committee[3] which greatly increased the awareness of the relevance of management in the Civil Service. Since then there have been the Fulton Committee[4] and the English Committee.[5]

The recommendations on training in this article are based on establishing a clear distinction between the roles of an administrator and those of a manager. Fulton identified[6] four elements of work in the upper reaches of the Civil Service; three of them are germane to this study. Firstly, there is the management of executive activities, the bulk of which arises out of legislation, such as taxation, social services, employment, etc. Secondly, there are administrative activities concerned with existing policies—high-level case work is an example. Thirdly, there is the formulation of policy. Thus there is a polarisation

of work. Firstly, the managerial type of work involving the day-to-day control of significant resources in pursuit of well defined executive tasks. Secondly, the administrative type of work concerned with policy formulation, high-level case work, the effectiveness of policy implementations, etc.

Fulton was critical of the quality of management in the upper reaches of the Civil Service. These civil servants, said Fulton,[7] do not see themselves as managers. The English Report states that some top managers in the Civil Service do not actually manage very much in the way of staff; they perform rather specialist functions such as policy formulation.

I doubt whether the managerial content of the work of the open structure has changed much since Fulton. Brian Currie of Arthur Andersen & Co has worked as a member of high-level management in both the private and public sectors. Writing in *Management Services in Government*[12] he says:

> 'I have always found public servants receptive to ideas about management accounting and all the other tools of good management—when they can see how to apply them to their own situations. Where they are unable to see how, it is not so much because they do not understand the techniques as because they have difficulty in seeing which parts of their activities are of a management nature and which are not. I find that they often underestimate the management content of their activities. I therefore see the priority as being to help civil servants conceptually to identify the respects in which they are managers. . . .'

It seems clear that successive investigators looking at the work of top civil servants have identified the need for more or better management. Recommendations have generally been in favour of more management—especially of a professional nature. Yet the top civil servants themselves seem to have difficulty in distinguishing between management activities and other activities. Even if they do, they seem reluctant to develop the management elements of their work to the point where it could be hived off to others who were primarily managers and not administrators. Of course one must remember that management is new-fangled; administration is thousands of years old, whereas management has appeared on the scene only in this century!

Ironically, there was probably a greater recognition of the different nature of managerial and administrative work immediately pre-Fulton than there is now. What has blurred the distinction is the abolition of the separate classes (especially the Executive and Administrative classes). Administration Trainees receive a good deal of so-called management training in their early years although anecdotal evidence suggests that few of them see themselves as future managers in the Fulton sense. The majority of them want administrative work.

The English Report did not attempt a dichotomy of work; instead it rather lumped together all the work of what is now the open structure into the term 'top or higher management'[8]—but it made the

very important qualification that some top managers did not actually manage—instead they were concerned with policy formulation.

Between Fulton and English, Desmond Keeling (the first Director of the Treasury Centre for Administrative Studies) published *Management in Government*,[2] the result of considerable experience in the Civil Service and far-reaching research. He clearly distinguishes between management and administration, and says that management is concerned with the best use of resources in pursuit of objectives; administration is concerned with the review of law, and decision-making on cases arising out of the law.

Currie[12] finds Keeling's contrasts between administration and management useful in understanding the different natures of administrative and management systems. He accepts Keeling's view that an administrative system lies close to a judicial system and is different from a management system. In Currie's view, to use an administrative type system where it is inappropriate will inevitably waste resources.

The mistake which the Civil Service appears to have made in the ten years since Fulton is in failing to nurture the distinction between management and administration which already existed pre-Fulton. Indeed the two are now generally used synonymously.

In the future a growing number of senior administrators will find themselves, at Under Secretary level, with the responsibility for making major decisions affecting complex computer-assisted systems. Most of them will be ill-equipped to discharge this responsibility because their career development will not have provided them with the necessary experience and training. If the job is in fact a managerial one then it will almost certainly be against their natural aspirations and regarded as detrimental to their career prospects as administrators.

The roles of senior administrators and managers

What are the appropriate roles for senior civil servants in relation to computer-assisted Civil Service work? Such work is already widespread and increasing.[9] Most of the Government's major administrative and executive operations are increasingly dependent upon computers. Civil Service computer applications fall broadly into two categories: (*a*) those which aid administration, and (*b*) those which aid executive management. In the former category are the systems which provide statistical information and manipulate models to aid formulation of policy and decision-making. In the latter, those which help to pay pensions, collect taxes, maintain accounts, control stock, issue licences, pay salaries, etc.

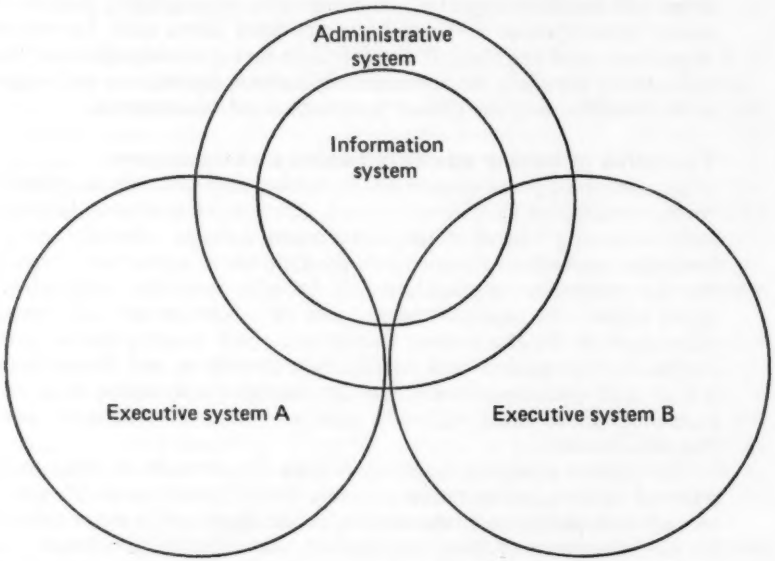
The former category is clearly within the domain of what may be referred to as administrative systems, that is, systems which are concerned with policy and law-making; with decisions on cases submitted for interpretation of laws, regulations, etc. The administrator reigns supreme in this domain. He is concerned with the quality and effectiveness of the total administrative system. The systems exist to assist the

administrator by the provision of timely and accurate information and of facilities to explore policy options by such means as mathematical models.

The other category of system is perhaps best described as an 'executive' system. In such a system the manager reigns supreme. He is concerned with the efficiency of the total executive system. The responsibility for substantial resources—and accountability for their use—should be key features of a senior manager's work in an executive system.

Of course, in practice the administrator and manager do not occupy self-contained domains; their work overlaps. An executive system may well be producing information as a by-product for the administrator to use. The administrator's work may well affect the future nature and extent of an executive system. Hence both administrator and manager need to have a clear understanding about each other's work and need to be able to collaborate on the basis of common knowledge and understanding about the nature of complex computer-assisted administrative and executive systems.

The relationship between the work of an administrator and that of a manager in departmental systems is illustrated in the following diagram:



The figure illustrates an administrative system which makes use of an information system to serve its needs. The information system's inputs come partly from two executive systems. For example, executive system A may be a personal income tax accounting system; executive system B may be a corporation tax accounting system. Both these systems would be under the command of a senior manager. Fulton[10] recommended that such commands as these should form accountable units, not only in budgeting terms but also in measurable standards of achievement. The information system may be a statistical and modelling system to aid the administrator in the administrative system. The command of the information system would also be in the hands of a manager. As with an executive system he is concerned with the efficiency of the system for which he is accountable; as with an executive system, budgets and measurable standards of achievements feature prominently.

The administrative system is the domain of the administrator. He is concerned with the quality of the output of the information system. The best use of resources is not such a central task for him as it is with managers. The administrator's output is not measurable in the same direct way in which a manager's may be. His objectives will tend to be global, and concerned with political, legal, social or economic considerations at a high level.

Thus the roles of senior administrators and senior managers are seen to be quite different, which is consistent with Fulton, Keeling and English. Next we must consider these separate roles in relation to those of computer specialists to determine precisely what administrators and managers are expected to be able to do in this computer age in which they find themselves. Once this is determined the training needs of senior administrators and managers should become clear.

Computer specialists

The difficulty in the Civil Service in distinguishing, in practice, between administrators and managers is matched by its difficulty in understanding the nature of computer work.

Current Civil Service policy is that computer work is a 'functional specialism' within the Administration Group. This was thoroughly ventilated in the *Longer Term Review* and a number of recommendations were made to help overcome the problems experienced in implementing this approach.

It is not necessary to examine the nature of computer work, the specialists needed or their roles; it is necessary only to consider how the administrator and manager ought to collaborate with computer specialists. Who is master and who servant? No one suggests that senior administrators and managers should be able to direct the analysis, design, implementation and operation of a complex socio-technical system without specialist assistance at the appropriate level.

The need for a senior specialist was spelled out by Reay Atkinson, then Director of the Central Computer Agency, when he addressed

Datafair 1977. He said that large organisations needed a senior person to relate technological trends to corporate plans.

Such a person may be variously described: the term Information Systems Designer (ISD) is adopted in this article. An ISD must primarily be experienced in the work of the administrative or executive system he is serving; for example, in economics, taxation, law, education, stock control and provisioning, social security, statistics, etc. Grafted on to his primary expertise the ISD needs additional skills and knowledge to perform the following tasks in his specialist capacity as an ISD. He must be able:

—to define precisely the operational requirements of administrative and executive systems;
—to design a computer-assisted system, be it an administrative system or an executive system—or a combination of both;
—to use the appropriate techniques, tools and methodologies to ensure that the above tasks are performed effectively and efficiently;
—to communicate the design to other specialists, managers, administrators and staff who will be involved in the detailed design and implementation of the total system;
—to plan and help control the implementation of the planned system;
—to monitor the effectiveness and efficiency of the working system; and
—to control the maintenance and modification of the system.

The ISD is likely to be a graduate. His first degree may be a general one or related to the area of work in which he finds himself, especially in areas like economics, statistics or financial management. Some computer-related experience early in his career may be beneficial but most important is 'application' experience. But what is essential is that the ISD should have the benefit of appropriate post graduate training in preparation for his role as an ISD. A suitable curriculum, as a guideline to what is required, is published by the International Federation for Information Processing (IFIP).[11]

Table 2 gives some idea of the content and duration of the recommended training for an ISD. The training would probably take a year and would be examined at Master's degree level.

Table 2—ISD Training

Course themes	Hours of formal tuition (including project tasks)
Computer and information processing systems	200
Management science	120
Organisation theories and practices	80
Methodologies for information systems design	300
	700

The need for this kind of training is as urgent as that for senior administrators and managers. Reay Atkinson addressed a meeting of senior civil servants at the London School of Economics (LSE) on 26th April 1976 to encourage central government departments to nominate students for a course based on the IFIP curriculum. He said that the course was intended to equip senior people 'to undertake the leading role of total systems architect taking into account, as well as technical matters, the social and economic effects of systems development'. He also said that such a course was suitable for the best people in the Civil Service 'who have, and increasingly should have, experience as administrators in the Civil Service sense, as well as technical competence'. The seriousness with which he viewed the need for this kind of training was forcefully put; he expressed the belief that 'if we fail now to train our best people effectively to meet the challenge (of the future) we will unquestionably fail in information processing by the end of this decade'.

The ISD is in reality a staff man—ready to serve and able to offer advice to those in command. He is partly an architect and partly a constructor. His creative thinking must be tempered with pragmatism. He must always bear in mind that the best administrative systems are probably those which are best implemented. To him will fall the task of advising top administrators and managers what practical use can be made of the multitude of computer-related devices. But the whole process of harnessing technology and people is unscientific and the best we can hope for in the task of improving administrative and executive systems is to move to somewhat better positions from worse. This is why this task cannot be left to computer specialists. The administrators and managers are concerned with the totality of the systems they command. Their judgement may well be based on a curious but necessary mixture of intuition, pragmatism, imagination, idealism, realism and political wisdom.

The people in command are the strategists who must decide upon courses of action which will achieve desirable goals, whatever they may be. And they must be accountable for all the decisions taken within their commands in fulfilment of these goals.

What senior administrators ought to be able to do

An administrator needs information from a variety of sources in diverse forms. The administrator of the future is likely to have at his service a computer-based information service to meet some of his needs and he may also use computer-driven models to help him evaluate the outcomes of different decisions.

What ought a senior administrator be able to do in connection with computer-based information services? I suggest that at the very least he ought to be able:

—to communicate his requirements to an ISD; the two of them must be able to discuss them in a constructive manner, each understanding the other's interests;

—to assess the results of the analytical work done under the ISD's direction following the discussion of requirements;
—to evaluate the ISD's proposals for satisfying the requirements;
—to authorize expenditure of resources (manpower, money, equipment and facilities) on implementation of the proposals;
—to exercise overall control of implementation; and
—to assess the effectiveness and efficiency of the operational system.
The administrator must be accountable for the entire system which provides him with the information he needs.

The training of an administrator must satisfy two requirements. Firstly, it must provide him with the knowledge and skills needed for the objective aspects of his job, that is, as a policy adviser, decision-maker, case worker, drafter of statutory instruments, etc. Secondly, it must provide him with the knowledge and skills needed for the organisational aspects of his job, that is, to enable him to discharge his accountability for the systems which provide him with the facilities and information needed for the objective aspects of his job.

Bearing in mind that an administrator would invariably have the services of an ISD, then a suitable curriculum can be approached via the current curriculum for training Administration Trainees and that for ISDs. It suggests that about some 800 hours of training may be required. *Table 3* shows a curriculum, grouped into what might be suitable training modules, which seems a reasonable approximation.

The modules of training may be implemented by a combination of learning and teaching methods but, most important, the training should be undertaken only when it is needed, not before—or after!

What senior managers ought to be able to do

A manager is responsible for the efficient use of resources in pursuit of defined objectives. He may be a manager in charge of an information system or in charge of an executive system. More than likely the system under his command will be partly for executive purposes and partly to provide information for administrative purposes.

A manager's training ought to be more technical than that of an administrator in the sense that he would tend to use more techniques and methodologies in his everyday work. He would be expected to measure the performances of people and machines; to plan, co-ordinate and control in greater detail; to exploit machines; to motivate large numbers of people. To discharge his responsibilities a senior manager must be able:
—to direct the investigation of the operational requirements of an executive or information system;
—to analyse the findings and appraise the conclusions and recommendations;
—to evaluate alternative systems proposals;
—to take responsibility for the choice of systems;
—to take responsibility for the specification of a system;

—to plan the total resource requirements;
—to direct the detailed design of all parts of a system (i.e. human and machine sub-systems);
—to manage the implementation of a new system and its subsequent operation;
—to measure and account for the system's performance; and
—to implement changes to the operational requirements.

Such a senior manager would be required to coordinate the activities of many people—generalists and specialists. In a large organisation the manager would be relieved of some of the above tasks by an ISD, but the responsibility of directing the ISD's work would nevertheless remain.

The training suggested assumes that the manager would have accumulated knowledge and skills associated with the executive function for which he is responsible—by a combination of training and experience. The curriculum set out in *Table 4* below is confined to extra knowledge and skills needed by him to manage a computer-assisted system. It amounts to 600 hours of tuition.

Two of the modules are common to administrators and managers. This would facilitate training arrangements and would also enable administrators and managers to discuss the common elements of their work.

The level to which the curricula for senior administrators and managers are taught ought to equate to that of a Master's degree. The majority of the trainees attending such courses would probably already hold a first degree, but usually in a subject unrelated to the kind of training proposed by this study. To the extent that a degree covered part of the curriculum the relevant module of training could be omitted.

Problems of implementation

Too often we are still ploughing when we should be reaping. Ten years after Fulton, why is it that the quality of management in the Civil Service is not as high as some people think it ought to be?

Pre-Fulton there was an Executive Class and an Administrative Class. Generally speaking this was a sensible division of labour—the former class concerned itself with management and the latter with administration. Fulton did not seek to merge these two functions—but did seek to abolish the separate classes. The effect of selectively implementing the Fulton recommendation has been to blur the distinction between administration and management. This has led to senior civil servants having a dual role. In such circumstances the civil servant does what he finds most interesting or what will best advance his career! But as most of these civil servants enter the service with an eye subconsciously on administration and not management, and as they are groomed for administration rather than management, it is not surprising that administration gets most of their attention. They are

Table 3—Computer Training for Administrators

Module	Subject	Tuition hours
1	Law Public administration Policy studies Policy analysis and review	300
2	Economics Financial management Accounting	150
3	Management science Statistics Operational research	100
4	Electronic technology hardware software applications	50
5	Systems analysis, design and implementation	100
6	Organisation and management Industrial relations Behavioural science	100

Table 4—Computer Training for Managers

Module	Subject	Tuition hours
1	Electronic technology hardware software applications	150
2	Organisation and management Industrial relations Behavioural science	100
3	Accounting and finance	50
4	Systems analysis, design and implementation Project management	200
5	Management science Statistics Operational research	100

victims of their own aspiration and of the culture in which they reside and which, in turn, they themselves help to reproduce. Therefore for management to be re-established in the Civil Service as a vocational calling in its own right requires the Civil Service to return to a pre-Fulton division of labour; to recruit selectively trainee administrators and trainee managers—both of the highest calibre; to train them as appropriate; to develop their careers along separate paths. This is not a regression; on the contrary it would ensure that the spirit of Fulton was implemented and that management in the open structure of the Civil Service had parity of esteem with administration.

Many posts in the open structure of the Civil Service no doubt require a mixture of administrative and management tasks. But surely there are many posts which could be identified as being substantially either management or administration, and staffed accordingly. It would seem to make sense to recruit, train and develop not one but two different populations of high calibre graduate entrants.

This article, though, is concerned not with the total populations of senior administrators and managers but only those who will have to be responsible for—and, hopefully, to be accountable for—computer-assisted systems. The conclusions and recommendations of the *Longer Term Review of Administrative Computing* support the view that, in future, there will be a need for increased skills amongst top managers and administrators in such matters as project management, systems analysis, systems design, investment appraisal, measurement of cost-effectiveness, formulation of computer policy and control of operations.

Hopefully, this article may stimulate thought and action.

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The Civil Service Catering Organisation—A Progress Report

H A Guest, Civil Service Department

Harry Guest is Chief Executive, Civil Service Catering Organisation. —*Editor.*

In two previous articles in *Management Services in Government* (November 1974 and November 1977) I reported on the setting up of the Civil Service Catering Organisation (CISCO) and its developing aims. A further report now might be of interest as it would have a bearing on other identifiable areas of government activity, both in the light of the Fulton Report, and the fresh concepts of the current administration.

I have always felt that the key to accountable management lies less in the conceptual approach of its application to blocks of votes than in the basic human motivation of feeling responsible for an area of activity and accountable to an identifiable authority for a satisfactory performance. CISCO's first task thus was establishing a right to be heard, based upon the solid foundations of a good management performance in accordance with the task set by the Civil Service Department (CSD)—a task agreed with Departments and the National Staff Side and expressed in terms of a financial performance yardstick.

The results to date

We can now confidently say that we have achieved our task and two examples should suffice in demonstrating this:

(*a*) The cumulative deficit, which stood at £846,000 three years ago, has now been reduced to £74,000 as at 1 April 1979 and should be eliminated in the current year.

(*b*) CISCO's task in contributing to the 1976 cuts, effective 1978/79, was to make a trading surplus of £250,000. This target has been exceeded.

The objective

Our primary objective remains, to provide a catering service for civil servants making the best possible use of resources. We have now run up against a number of constraints inherent in the constitutional responsibility of departments to their ministers and of the CSD for its vote which, however much they may safeguard public funds in the traditional way, undoubtedly prevent us from achieving the best possible result in providing a service to our Civil Service customers.

The CISCO operation is thus an admirable example of the limitations of accountable management within the present largely historical constraints of a traditional vote, and the lessons that can be learned have a much wider application than might be inferred from the basic objectives of CISCO.

The current functions

This problem can best be grasped by setting out the six main functions which CISCO performs and which have evolved out of the needs of the service as set out in my two previous papers:

(1) professional advice to the Civil Service Department in the evaluation of the catering element of the staff benefit package; explaining and defending this policy to departments and staff sides at local, departmental and national levels;
(2) professional advice to the Property Services Agency (PSA) on catering installations, buildings and equipment within their jurisdiction (with a few special exceptions);
(3) operational management with direct line management control of approximately 250 directly run restaurants;
(4) operational management on an agency basis of over 100 restaurants providing a catering service to the Training and Employment Services Division of the Manpower Services Commission;
(5) technical and catering advice to approximately 450 management committees responsible for staff restaurants and some 20 non-Exchequer bodies requesting our assistance on a repayment basis;
(6) the general monitoring of catering contractors in various areas of the public service and the commissioning and supervision of contractors and consultants within the public area covered by CISCO.

The CISCO concept of accountable management

Before commenting on progress and problems under these six headings, I would like to restate three cardinal principles of management which we have tried to follow in the development of CISCO:

(1) The organisation must be built up on the carefully defined authority of unit management for gross profit, sales mix and overall profitability, leaving headquarters' main role as the safeguarding of cash, manpower and capital, and the full range of forward planning.

(2) Communications must be based on a standardised form of accounts leading to standardised forms of projection, common to all levels of management, not only within CISCO, but also to the senior authority to whom I am accountable (the Second Permanent Secretary of the CSD as Accounting Officer, and through him to Parliament).

(3) Management in a commercial setting can only be effective if all levels have maximum freedom to use the resource mix of capital, labour and time. This concept is strange to civil servants, who are concerned with the management of compromise in which time is usually a constraint imposed by outside authority. These different approaches to the use of time lie at the root of many problems when civil servants have to guide or advise on commercial activities.

Progress up to 1979

(1) *Professional advice*

We have clarified with CSD the difference between the catering management task and the staff benefit package, and they recognise the need for early consultation on changes due to fluctuating resources available for the catering provision. Particularly we have improved the understanding that the capital element represents a resource demand and that there is a need for mixing levels of subsidy and levels of provision to achieve the best value for money and benefit for staff. The one aspect still to be tackled is to find a way of putting capital expenditure into a closer relationship to trading outturn than has to date been possible because of the separation of votes for the subsidy and for the premises.

(2) The improvement still to be achieved is to look upon capital expenditure in catering as part of the catering resource rather than part of PSA programmes. Through periods of cuts and bounty we are repeating this message.

(3) *Trading operations*

Allowing for lapses from grace caused by the effect of pay policy on catering staff and other operational constraints, and judged by our statistical indicators of main meals and takings per full-time staff equivalent and takings per square footage of catering area, we believe we are improving our efficiency steadily. Compared with other industrial catering organisations, we are closer to resource allocation and inventive and forward looking in the use of equipment and in the development of new services. Some of the new snackery counters, omelette bars and take-away points are admirable examples of applying high street fast food techniques to catering services for a semi-captive audience and they show the same dramatic increase in turnover and customers.

(4) *Advisory services*

Because of our regional organisation and the awareness of the importance of the resource mix, both on the trading and capital account, we have been able to help committees through a difficult trading period. We suspect that the task will become increasingly onerous and are thus exploring other ways of helping to maintain an acceptable catering service to civil servants.

(5) *Consultancy services*
Because of our continuous monitoring of existing operations and our advice on the most effective forms of capital expenditure we have been able to keep catering at controlled costs in courts, museums and parks. Our detailed marketing and design briefs have made the services more acceptable to customers and produced more accurate forecasts of the total demand for public resources.

How do we compare?
I have recently attended an international conference where fourteen nations were represented to explore new forms of training for catering graduates and compare problems and progress in our respective countries. I now have no doubt that the subsidy system for Civil Service catering is a unique and most effective management tool. Both CISCO and committees receive a subsidy of 20 per cent of food turnover provided the gross profit is 45 per cent, and we lose 1 per cent of our subsidy for each point the gross profit drops below the target figure. Whilst the formula has fine variations to allow for various contingencies its effect has been highly beneficial in several ways:

(*a*) catering management at all grades is commercially orientated to maximise turnover but not to reduce value because of its cut-off point;
(*b*) catering unit management has full authority on their sales mix and gross profit and we are at present exploring the use of various computer processes based on microprocessors to provide additional information;
(*c*) we can budget ahead effectively for the whole of CISCO and can thus predict the need for price increases sufficiently far ahead to be able to select the most acceptable timing and commodities;
(*d*) we can resist pressures to defer price increases arising from union or management considerations because we can quantify at any given moment the consequences of arbitrary interference with CISCO cost structures.

Project planning
We have been able to press forward with new services and developments because we could demonstrate that smaller space and less catering equipment can provide a more acceptable service to our Civil Service customers, and have developed now a planning package which projects with considerable accuracy the likely trading outturn of a catering operation in any Civil Service establishment.

A gap in information
The present levels of subsidy and provision have been agreed as a result of historical developments and discussions with Staff Side and unions. I believe that at some time an attempt should be made to

quantify the benefit to staff of subsidised catering facilities. However difficult, a detached review is bound to be better than the present level which has arisen from a series of compromises over a period of years.

Management development

Because the role of the unit catering manager is so important we have spent time, money and energy on a major programme of management development. Under the guidance of the Kingston Regional Management Centre we have had a series of seminars at all levels of management, i.e. Unit Managers, Regional Catering Officers and Directors, and are now running six Management Development Units (MDUs) where managers of all grades are sent to remedy identified weaknesses in their performance, whether they be managerial, financial, catering crafts, or human relations and, under the guidance of trained unit managers, are able to improve their performance. We have not set up these MDUs to be perfectly efficient demonstration units but to be aware of the host of problems catering management faces, and to enable all trainees to widen their horizons and levels of comprehension of all the skills and crafts needed to fulfil the ultimate role of catering management, the management of compromise under time pressure.

The way ahead

CISCO has a clear brief expressed in financial terms but at a future date an attempt should be made to quantify, on social and economic grounds, the most suitable level of subsidy to catering both in terms of capital and revenue.

(1) Capital expenditure on all catering activities, whilst remaining on the PSA vote, should be allocated within overall CISCO control.

(2) The CISCO vote should be developed further to reflect the total trading activities and should be permitted to carry forward deficits and surpluses for up to three years.

(3) CISCO has now reached a stage in its development where further challenges would help to improve performance and morale, and regardless of political doctrine, should be permitted to quote for outside activities both on a consultancy basis for new installations (including in the Third World) and for trading operations on public premises in the United Kingdom, and any profits earned should be used to subsidise prices to Civil Service customers.

The Diplomatic Service Inspectorate

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Mr Russell's Inspectorate is charged with the management audit of the Diplomatic Service at home and abroad. —*Editor.*

History

All Government departments have a staff inspection system. But the Foreign and Commonwealth Office (FCO) and the Diplomatic Service have over the years invested their Inspectorate with an aura, if that is the right word, which is rather different. Perhaps it is a question of history. The Diplomatic Service Inspectorate goes back to the middle of the 19th century when the Foreign Office in London and heads of post overseas felt the need for a control system which would ensure the maintenance of world-wide standards and the availability of resources to carry out the necessary tasks. An early description of the inspectors was written by the consul at Alexandria in 1850 when, in a memorandum proposing the appointment of a corps of inspectors, he said that they should be officers 'to whom a rank should be given, removing them beyond the influence of cajolery or slight, fully capable of pointing out to consuls the necessity of alterations in their practice, thoroughly acquainted with the details of the service in all its bearings, and with instructions to do all in their power to improve the service without personal complaint, except in extreme cases'. The first recorded inspection was carried out at posts in the Baltic at about that time and in 1871, following a Select Committee of Enquiry, three inspectors were sent out to report on posts in Europe. But it was not until 1905 that a regular Corps of Consular Inspectors was established which provided the foundation for the present Diplomatic Service Inspectorate.

The role of the inspectorate

The current terms of reference for inspectors overseas are:

> 'To recommend in the light of stated operational requirements such arrangements for British representation (including HM diplomatic missions and consular posts, High Commissioner's offices and their outposts, the British Council and service and civilian attachés and advisers) as will enable that representation to be carried out effectively and efficiently.'

The aim of the inspection is to achieve economy in the true sense, i.e. the least possible expenditure in terms of manpower, money and material consistent with policy, operational requirements, local cir-

cumstances and the good morale of the staff. The second purpose is to review foreign allowances and to ensure that the administration of diplomatic missions and consular posts is being conducted in accordance with Diplomatic Service procedure and regulations. The Inspectorate is also responsible for advising FCO departments at home and posts overseas on solutions to their management organisation and systems problems.

At home the Inspectorate's terms of reference are:

> 'To review the responsibilities, organisation and establishment of departments of the Foreign and Commonwealth Office and to recommend any changes desirable in order to facilitate the most effective and efficient discharge of their responsibilities.'

The Diplomatic Service Inspectorate thus provides a management consultancy service for the Diplomatic Service at home and abroad and fulfils what might be described as a 'communications role' in ensuring a continuous flow of information between the FCO in London and posts overseas on management, staffing, allowances, morale and other problems.

Organisation: the Chief Inspector

The Chief Inspector controls the Inspectorate and directs its operations. He is an officer of Grade 3 rank who also has additional duties as an Assistant Under Secretary on the management side of the office. In addition to controlling the programme of inspections at home and overseas he acts as an adviser on the whole range of management problems at home and overseas.

The overseas inspectorate

Below the Chief Inspector the Inspectorate is divided into two arms: a corps of overseas inspectors and a home inspectorate. The overseas arm consists currently of five teams, each team headed by a Grade 4 inspector (Counsellor or Assistant Secretary) backed by an assistant inspector (Grade 6 or Senior Executive Officer) and a personal assistant (S1). The composition of each team is designed to provide a balance of experience and to ensure that the team is able to deal effectively with the whole range of problems with which it will be confronted in a post overseas. The Grade 4 inspector will have had from 15 to 20 years' experience in the service in a variety of posts and functions at home and overseas. He leads the team and controls the inspection. His experience will have given him the ability to size up the main functions of an embassy or high commission, to relate these to the scale of British interests and the political and economic circumstances of the country concerned and to recommend appropriate staffing levels and organisation. He is also concerned with the post security arrangements. The assistant inspector will normally have had considerable experience of administration in the Diplomatic Service, also frequently of consular

and commercial work. His main responsibility will be to inspect the post's administration, accounts, consular and visa work and their overall procedures. The personal assistant, perhaps uniquely in Government service, plays a full part in the team's operations. Not only is she responsible for the secretarial work and the typing of the team's reports, which are completed at post and left with the head of mission, but she manages its travel and internal administration, herself frequently inspects the secretarial staff and office equipment at post and participates fully in the review of allowances.

The Diplomatic Service inspectors may be joined in their work at certain posts by Civil Service Department (CSD) inspectors to cover allowances, by a Ministry of Defence inspector to assist in the examination of the Defence Staff and by an Overseas Development Administration (ODA) inspector where Development Divisions of the ODA are concerned. The Internal Audit Unit of the FCO's Finance Department, which specialises in systems of financial control, may visit posts jointly with the inspectors, and also visits posts periodically between inspections. With five teams of inspectors, it has been possible to cover all posts in the world on a three-and-one-third-year cycle. From spring 1980, however, the overseas inspectorate will be reduced to four teams and we shall then move to a four-year cycle for all posts. This, however, may come down as the number of posts is reduced as a result of public expenditure cuts.

The inspection of allowances is separate from the general management audit of a post. All Diplomatic Service and home Civil Service officers serving overseas receive allowances. The composition of these is complex. Certain allowances are essentially related to the cost of living; others to the job an officer has to do. The task of the inspectors in conjunction, where necessary, with their CSD colleagues, is to recommend revision up or down in allowances in the light of changing circumstances at the post. Fluctuations in exchange rates and increases in pay scales at home are also relevant. All members of the inspection team participate in this exercise, either in the pricing of goods in the local markets or in the calculation of job-related allowances for individual officers from the head of mission downwards. I have described this task as the second purpose of an inspection. But it is a vitally important one for the welfare and morale of staff.

The home inspectorate

The home Inspectorate is a rather different animal. It is not concerned with the examination of allowances, housing and all the other aspects of life in a post overseas which the inspector must take into account there. The home inspectors' task is to keep under review the functions and establishments of all departments in the FCO, including such outhoused departments as Communications, the five Passport Offices in the United Kingdom and the India Office Library and Records. Given that the FCO absorbs over half our total personnel, the need

to ensure that it is effectively but economically staffed and organised is clear. Up to now FCO at home has not been scrutinised on such a regular or systematic basis as posts overseas. But the economies required of the FCO, in common with other departments, have highlighted the need to remedy that situation. We intend that FCO departments, like posts overseas, should be inspected regularly over a three- to four-year cycle and the current programme of home inspections envisages a complete coverage of the FCO over the period from mid-1978 to the end of 1981.

To that end the home Inspectorate is being reinforced at the expense of the overseas arm and will now consist of a Head of Home Inspectorate at Grade 4, a second home inspector of the same grade and separate units covering management services (O and M), automatic data processing (ADP) and the supervision of Diplomatic Service procedures (DSP). This composition is designed to enable the home Inspectorate not only to examine existing functions, staffing and procedures, but also to advise on the introduction of new methods and equipment with a view to shaping our organisation and operations for the future. We are also introducing a system whereby groups of kindred departments are examined together as part of an overall examination of blocks of work. For example, the inspections for the first half of 1980 will take in the whole economic group of departments as one operation and the Information Departments and Cultural Relations Department as another. In this way we hope to facilitate the reshaping of departments, not only to take account of changing circumstances but also to ensure the best utilisation of scarce human resources.

The inspectorate's achievements

The Diplomatic Service and the FCO have been subjected to more outside scrutiny than probably any other comparable branch of government. Three major reviews have taken place in the last 15 years, embodied in the Plowden Report (Cmnd 2276) of 1964, the Duncan Report (Cmnd 4107) of 1969 and the Central Policy Review Staff Report* of 1977. But though these reviews have exercised a greater or lesser influence (in the case of Plowden a very great influence) on the operations of the Diplomatic Service, it has been largely through the work of the Inspectorate that the deployment and size of the service have been adjusted to the demands made on it and the resources made available to it.

The period has been marked by successive financial squeezes and the pressure for economy on manpower and money has been constant. At the same time, although much of the work performed by the Diplomatic Service, particularly political and economic, is not quantifiable statistically, the indices for commercial, immigration and passport work have all increased substantially in recent years. There is no reason

* *Review of Overseas Representation* (HMSO).

to think that the weight of political and economic work has not equally gone up. It certainly has not got any less. Between 1973 and 1978 the number of visits to British posts overseas by businessmen rose by 42 per cent from 39,800 to 56,688, the number of trade missions assisted by 62 per cent, from 156 to 253, and passports issued by overseas posts by 47 per cent and by Passport Offices in the United Kingdom by 44 per cent. Immigration work has gone up by over 50 per cent and telegraphic traffic between the FCO and overseas posts by about 20 per cent. Thus the combination of financial squeeze and increasing workload has made essential the requirement to maximise the use of our resources and to achieve real increases in productivity. The success of the FCO and the Diplomatic Service in this regard is shown by the fact that between 1969/1970 and 1979/1980 (before the current round of cuts), the FCO and Diplomatic Service (excluding the Communications Division, the Passport Offices and Government Communications Headquarters) had reduced their manpower by 8.6 per cent, from 6,666 to 6,095. This year's further economies and the Lord President's exercise will reduce that last total to about 5,600 by 1982/1983.

Until the closure of some 15 consular posts and the reduction in the size of eight others announced this autumn these economies will have been achieved not by eye-catching, one-off measures, but by the steady work of the Inspectorate in applying the principles of good housekeeping to our work. For example, the overseas inspection of some 50 missions and subordinate posts during the 12-month period from September 1978 to September 1979 produced savings of 21 United Kingdom-based and 88 locally-engaged staff. Within that total the inspection of all our posts in Canada in the summer of 1979 resulted in reductions of eight United Kingdom-based and 22 locally-engaged. At home, inspections during the same period produced recommendations for a total saving of some 90 posts. The need to achieve savings over a period through a multiplicity of adjustments which may seem relatively minor in themselves is conditioned by the fact that overseas the Diplomatic Service is split up in general into small units. Over 90 of our missions and consular posts have a United Kingdom-based staff of six or less. Only six posts have a Diplomatic Service United Kingdom-based staff of more than 50. Moreover this system ensures that adjustments are made in the light of changing workload and with the minimum of disruption to the normal conduct of business.

The future

The period ahead promises to be difficult. The pressures on government expenditure and the need for economies will continue, while there is no reason to suppose that the international business in which the United Kingdom will be concerned will grow any less: rather the reverse. Trade will grow, more people will travel and the world's trouble spots seem likely to increase. In these circumstances the Foreign

and Commonwealth Office will need to ensure that at all times it has its resources under close scrutiny and is able to allocate those resources to the best advantage. At the same time the next few years seem likely to be a period of major technical innovation in terms of office machinery and electronic means of handling work. FCO, like other departments, must be ready to exploit these opportunities. The Diplomatic Service Inspectorate may not be perfect, but it has proved its capacity to adapt to new requirements, and provides an effective and essential stimulus to the good management for which we all strive.

New Computing Equipment—The PERSONA GRATA

Of all the new machines flooding the market we cannot help but be impressed by the details of one that somehow reminded us of something we had seen before. Although by no means the answer to every office problem it clearly offers many advantages that the conventional machine lacks.

Basically, the PERSONA GRATA is a STANDALONE non-logic system with an attractive configuration linked to a single mainframe. It possesses a high-speed optical display unit and twin floppy discs. Somewhat surprisingly, its internal memory is contained in its main buffer store. Its carriage moves horizontally and it has considerable digital capability. The average layman may regard it with an air of mystery until he becomes familiar with its software.

The PERSONA GRATA can be used for modelling but is capable of manipulation and emboldening through simulation techniques.

It has, however, certain adverse features. It is not possible to change to a different typeface when required and has only a limited capacity for automatic feeding. The visual display area sometimes presents a blank space for the next impression. Its software is seldom interchangeable. Very few models permit random access.

A number of types of PERSONA GRATA are currently available and they vary widely both in standard of performance and the degree of sophistication offered. Careful choice followed by a period of intense trial is advised before a decision to hire or rent is made. The makers recommend regular servicing to ensure smooth performance.

Extending the Life of Computers in Government

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Responsibilities in government computing

Each government department is responsible for its use of computers as a method of achieving the policy objectives of its Ministers. But one of the tasks given to the Civil Service Department when it was set up in 1968, was to promote efficiency through the development and dissemination of administrative and managerial techniques. The Central Computer and Telecommunications Agency (CCTA) is an integral part of the Civil Service Department; its role is to promote computing in government administration with the aim of improving efficiency and widening policy choices. The agency advises departments on possible computer applications both internally and across departmental boundaries, and on the development and implementation of projects. It also provides central support services. The function is, however, one of regulation as well as of service. Departments are expected to implement policies and associated procedures which are mandatory, such as the Government's computer procurement policy, and to follow good practices such as are prescribed for the staged development of projects. CCTA is also at present responsible for the approval of expenditure for departmental computer projects, and for the procurement of computer equipment for departments.

The development of a computer life extension policy

In the 1976 Public Expenditure Survey a shortfall became apparent between the resources likely to be available over the following four years for computers and the needs of departments. This shortfall increased over the period to the point where, at its end, requirements were estimated to be approximately 25 per cent greater than sums likely to become available to meet them. A planning group was therefore set up within CCTA (then the Central Computer Agency) to study the problem. In January 1976 it made recommendations as to how existing computer resources and future investments might best be employed to secure financial savings without impairing either the efficiency or the effectiveness of central government administration. This led to the formation of an Economy Programme Branch in CCTA in

February 1976 to implement the recommendations. It was required to work closely with departments and had as its main functions the development of a computer life extension programme, reviews of computer installations to seek means of increasing efficiency and effecting cost savings, an examination of the task of converting existing government ICL 1900 and System 4 computers to the later ICL 2900 range of computers and the redeployment of any surplus computer equipment.

For a variety of reasons computer mainframe equipment in government before 1976 tended to be replaced after some seven or eight years of use although generally a maintenance contract for 10 years had been negotiated. The operational need to have a substantial period of overlap whilst the existing system was phased out and its replacement phased in could often lead to the provision of major expenditure and delivery of replacement equipment as early as year five or six of a computer's life. An inter-departmental group of computer users was formed late in 1976 and considered a proposed life extension policy whereby CCTA would require departments to plan on the basis that, wherever possible, existing systems should be used for at least 10 years and longer if possible. This life extension policy was endorsed by the interdepartmental group in May 1977 and effort was concentrated on an extension to a 10-year life. This 'first' stage in implementing the policy achieved a significant deferment of expenditure on replacement equipment.

The next step was to consider the most cost-effective full life of a computer system. This can vary greatly from system to system and depends on a number of variables; the reliability and resilience of the system; the willingness of suppliers and the availability of expertise to maintain the equipment; the availability of spare parts, etc. In general it was found that the computer hardware could be divided into two distinct categories; the electronic components which are capable of a life well in excess of 10 years, and electro-mechanical devices which have a normal life expectancy somewhat less than 10 years. Investigations confirmed that certain computer ranges were capable of extended life beyond 10 years and could have an economic life of as long as 12–13 years or more, provided they were adequately maintained and closely monitored to ensure the timely replacement of those electro-mechanical devices which were subject to wear. It was therefore agreed that some computer installations would continue with the existing equipment for periods of some 12–13 years, and that the replacement systems for these installations should be deferred accordingly. The effect of this 'second' stage was to achieve further reductions in expenditure, including the delay of some costly labour-intensive program conversion operations.

CCTA did not expect, and did not receive, the prior agreement of suppliers to a life extension policy which deferred their opportunities for securing orders for replacement equipment, but once the policy

was announced support was received from them in a number of ways; for example, they agreed to extend, with various conditions, maintenance contracts beyond 10 years at CCTA's request.

There is a policy* for the procurement of computers for government which is to acquire large computers, and computers leading to them, by single tender action from International Computers Ltd (ICL), subject to satisfactory price, performance and delivery date. As a result ICL supply some two-thirds by value of government requirements. Mindful of this special relationship, CCTA and ICL have developed a series of joint actions to assist and aid the Government life extension policy. Examples of these actions are:

(1) The provision of technical assistance by way of joint technical appraisals. A joint ICL / CCTA team visits nominated installations, inspects equipment and presents a single report on the technical viability of the hardware for life extension.
(2) The setting up of refurbishment lines to replace equipment identified as suffering from wear. A refurbished item is delivered to site, replaced when operationally convenient, and the 'hulk' returned to the factory for refurbishment and eventual delivery elsewhere in government.
(3) The provision of assistance in the relocation of surplus and/or part-worn equipment capable of further economic life, and the availability of expertise for inspection and maintenance of devices stored pending their relocation.
(4) The development of agreed criteria to be used in determining when fair wear and tear of equipment has taken place.

This last item has been regarded as one of the most beneficial and permanent advantages of the whole programme. It is, so far as can be ascertained, the first time a supplier and customer have been able to reach agreement on such criteria. Apart from the planning and budgeting advantages, it ensures that equipment on site is always in good condition, that adequate early warning is given of replacements, that spares are readily available and contractual difficulties minimised. These criteria are likely to become a permanent feature in all future negotiations on the life of equipment.

The effects of the life extension policy have been described as leading to the deferment of expenditure and labour-intensive conversion programmes. A further benefit during the last three years has been associated with the dramatic changes in the power/cost ratio of computer systems, including the ICL 2900 range, and the means of converting applications. Whereas, previously, conversion to ICL 2900 could be carried out only by means of a programme requiring the purchase of a new system and the running of both old and new systems during the conversion period, often involving hundreds of man years of effort over

* House of Commons Official Report (Hansard) 27 July 1977, col 227.

as short a period of time as possible, a number of facilities are now available which materially assist the user to convert his present system in an effective way. The most important of these is known as Direct Machine Environment (DME), which enables the user to run his 1900 or System 4 work on 2900 equipment. DME will allow the user not only to undertake his work using either 1900 System 4 or 2900 programs, but it will also enable a full life to be obtained from his current peripherals which can be used with the DME machine. DME, and the many other conversion and convergence packages, together with an assurance from ICL of full support for these aids throughout the 1980s, mean that when a user's replacement systems are eventually procured, changeover will be effected in a cheaper and better way than was hitherto possible. Most important of all, conversion will take place over a period of time dictated by departmental needs, hopefully without recourse to additional manpower resources.

What of the future? A government life extension policy has been shown to be cost effective against available alternatives, and other worth-while savings are now attainable by use of the new equipment and techniques. CCTA now need to consider with departments the optimum cost-effective life for each computer system, bearing in mind that the circumstances for each site will be different.

Costs and savings of a life extension policy

Staff costs for the definition and implementation of the life extension policy, together with storage and maintenance costs for surplus equipment, have been estimated at about £500,000 in the period 1976 to 1985. Over the same period a saving of over £5 million is expected from the re-use and relocation of surplus equipment. Rebuild lines for the refurbishment of equipment are expected to show a further £2 million saving compared with the cost of buying new equipment.

Other savings are more difficult to quantify. The extension of life policy is expected to yield nearly 200 additional computer years up to 1985. Of these some 40 years are gained from sites going beyond 10 years of life. If the Government Borrowing Rate is applied to deferred capital costs a considerable saving up to 1985 can be expected, after taking into account refurbishment and running costs. This figure varies considerably according to the Government Borrowing Rate, but if a figure of only 12 per cent is used the saving could be as high as £40 million over the period. By 1985 expertise and spares for current ranges of equipment are likely to decline significantly, and it is considered impracticable to extend the life of the ICL 1900 and System 4 ranges of equipment beyond that date. The savings are clearly significant but cannot be stated with precision because:

(1) such savings as might have accrued by an earlier move to equipment of a new and more advanced technology have been lost by extending the life of present equipment;

(2) the calculations relate to the long term and could be affected by changes in policy by suppliers, the availability of expertise or spares, etc.; and
(3) it is not always possible to predict accurately the type, and therefore the cost, of the replacement system which would otherwise have been installed between now and 1985, given the rapid development of the industry.

Of course, departments might have sought to extend the life of their existing equipment for reasons other than economy (between 1958 and 1976 some 15 sites had a life exceeding 10 years), but such extensions for modern equipment could not have been successful without the development and application of the procedures and arrangements outlined above. The important fact is that life extension has been made possible and safe, and departments, for whatever reason, are taking advantage of it and thereby saving money.

The February issue of *Management Services in Government* usually includes a list of management consultancy assignments commissioned by government departments during the preceding calendar year. We have had to hold the list over on this occasion but hope to include it in the May 1980 issue.

Central Management Services in a Devolved Administration

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Introduction

The Northern Ireland Civil Service (NICS) O and M, as it then was, came into being in 1946 as a branch of the Ministry of Finance, where it remained whilst growing in size and the scope of its activities until 1976. It then became part of the newly formed Department of the Civil Service (DOCS) and was subsequently developed to form the MS Division (MSD) of that department.

The primary role of MSD is to undertake O and M assignments—ADP and work study are undertaken separately—throughout the NICS, which comprises eight departments. Assignments are, however, also conducted on a regular basis in certain statutory bodies such as the four Area Health Boards, the five Education and Library Boards, the Police Authority and the Royal Ulster Constabulary. This group of organisations has a staff complement in excess of 100,000.

The potential area of activity can be put into perspective when it is realised that the NICS departments cover such diverse activities as education, health and social services, commerce, manpower services, agriculture and environment. In this situation assignment officers must also possess a considerable degree of versatility and adaptability, as well as a fundamental knowledge of the service if they are to be effective.

The devolved nature of the Northern Ireland administration does not in itself influence the role of central MS, which is concerned with the promotion of efficiency in the organisations in which it is working regardless of the type of administration to which those organisations have allegiance. The problems arise in ensuring the provision of an adequate service to so many bodies with so many diverse interests and responsibilities and who have no management services resources themselves. Partly because of the diversity of activities both within and between departments and partly because of the centralised MS organisation—which has over the years built up a reputation for the provision

of a satisfactory service—there is no shortage of requests for MSD services, and these range from small methods assignments to more far-reaching organisational studies.

MS organisation

The Head of MS reports to a Senior Assistant Secretary who is also responsible for the Staff Inspection and Computer Services Divisions which provide central services to the NICS in their own fields. Hence, whilst the three divisions operate independently they have a common reporting structure and a closely-knit system of co-operation.

The ultimate responsibility for all divisions rests with the Permanent Secretary of the Department of the Civil Service who reports directly to the Head of the Northern Ireland Civil Service as the chief adviser to the Secretary of State for Northern Ireland on all transferred matters and who has overall responsibility for the co-ordination of the work of Northern Ireland departments, including resources and staffing. The Permanent Secretary also relates directly to the Minister of State charged with responsibility for the work and functions of the Departments of the Civil Service, Finance and Manpower Services.

MSD has a staff of 40 which includes grades ranging from Assistant Secretary to Executive Officer, the lowest operational grade. The division is divided into three branches, each controlled by a Principal who has responsibility for the conduct of assignments in specific areas of the NICS and statutory bodies. This arrangement has enabled a certain rapport to be established between MS staff and the departments for which they are responsible, thus reducing any feeling of remoteness there may be between departments and the central MS organisation. Although therefore the work of most staff is specific to certain departments, they have the advantage of being members of a larger MS organisation and consequently have easy access to an extensive range of experience which can be invaluable in the execution of the many varied assignments with which they become involved. Practical experience has also shown that the establishment of a point of identity between individuals in departments and MS can assist significantly in smoothing the road to implementation. On the other hand, the commitment of individuals to departments reduces flexibility in designing and maintaining an assignment programme. There are occasions therefore when priorities are such that team allegiances have to be ignored in the interests of expediency.

The allocation of priorities itself can present difficulties. Outside the confines of individual departments this becomes the responsibility of the Head of MS, who can thus be faced with a decision concerning the relative merits of the demands of, for example, DHSS and Agriculture. Fortunately such problems seldom arise in practice.

Method of operation

In the main, MS operates by invitation and the number of invitations

from departments provides an indication of its success. In Northern Ireland departments are small and progress is only sustainable by the creation and maintenance of the correct image, a factor of which MSD is always conscious. Over the years, however, occasions have arisen when inter-departmental considerations have necessitated an MSD initiative. Examples are the Civil Service dispersal from Belfast, a review of the NICS reprographic requirements and, more recently, a feasibility study of the possibility of introducing an automated office into the NICS. All these assignments have been initiated without invitation, but the relationship between MSD and departments is such that no introductory problems have been encountered and the fullest co-operation has always been freely given.

The operation of a mainly invitational service, however, does present problems in, for example, ensuring the cost effectiveness of MS. The question arises whether the invitational system ensures that the resources of MSD are being used to the greatest advantage of the service as a whole. This may not always be the case since departmental demands are inevitably concerned with their own operational problems.

Whatever system is employed it is essential that MS staff should always enter a department with the agreement of the staff in the department if not with their complete support. Whilst it has been generally accepted in the past that to operate by invitation was the only means of ensuring complete acceptability, experience has shown that this is not necessarily the case and that entry by request, for example, can yield satisfactory results if properly managed in certain types of assignment. To say this is not to advocate a universal right of entry for MS; instead experience suggests that cost effectiveness may be maximised by a mixture of planned reviews and conventional invitational O and M. So far as a central MS unit is concerned, operating in the type of environment that prevails in the NICS, there would be no intrinsic difficulty in this method of operation.

In addition to assignment work, MSD must be in a position to advise departments about the purchase of office equipment and MSD approval is required before HMSO will supply a number of items. For this reason some members of staff are designated as 'subject officers' whose role is to become knowledgeable in their subject and up to date with all developments. These officers combine this work with their normal assignment work. This central approval role is particularly useful in the maintenance of uniform standards and in ensuring the most economical use of equipment throughout the NICS.

MSD also maintains a register of management consultants and approves their appointment by departments; frequently also assisting in their selection and in monitoring their activities during an assignment.

Acceptance and implementation

Central MS is not subject to any departmental constraints and has the advantage of being able, with some justification, to claim independence.

This is considered to be particularly important as it ensures objectivity in MS recommendations which may not be so forthcoming, particularly in the NICS context of small departments, if MS were organised departmentally. Although this independence can help its credibility, MS, as an advisory body with no executive authority, relies mainly on persuasion to effect acceptance and subsequent implementation of recommendations. This process is helped significantly by the introduction of a sense of commitment to change in departments. This involvement is normally generated during assignments by regular discussions with line management before reports are issued, enabling many problems to be anticipated and overcome at an early stage. The organisation of central MS itself also helps to achieve a high degree of acceptability in that assignment officers are well known to their colleagues in other departments as highly trained and experienced analysts with a considerable knowledge of the areas in which they are working. Coupled with a well-defined follow-up procedure, this leads to a high level of implementation in most cases, although inevitably there are some notable exceptions.

All major assignments are subjected to a follow-up procedure. This involves periodical visits to customers after the issue and initial discussion of a report. These contacts, which can last for 12 months or more, enable assignment officers to see how implementation is proceeding, to provide any necessary assistance and to assess the effectiveness of their recommendations in practice—a particularly useful aspect of on-the-job training.

Recruitment of MS

Whilst recruitment can take place at all levels from Executive Officer to Principal, the former is the main recruitment grade. In the main staff are recruited by trawling the NICS so that recruits can be carefully selected to come to MS on promotion to Executive Officer. After an appropriate period in MS the staff become eligible for consideration by a departmental promotion board and, vacancies permitting, can be retained in MS on promotion to the equivalent of Higher Executive Officer. This means that staff can stay in MS for at least four to five years; some stay considerably longer and can reach the grade equivalent to Senior Executive Officer, and exceptionally Principal, within the division. Eventually the staff move out, normally on promotion, when they may have spent anything from five to ten years in MS.

Although staff are recruited to MS from general service grades, the work and requisite knowledge are rather specialised and it is considered that in addition to formal training, some 12 to 18 months' experience in MS is necessary for staff to become fully effective. For this reason it is desirable to retain staff in MS for at least five years if they are to make a satisfactory contribution to the work of the division.

Experience in MS is also considered to be generally useful in that it broadens horizons and provides a knowledge of work in different

departments which can significantly benefit staff in their subsequent careers.

Although the method of recruitment to MS has proved satisfactory over the years it can present problems in that it limits the potential for moving staff back to their parent departments if this should become necessary, particularly as they come to MSD on promotion. This problem is exacerbated by the smallness of the Northern Ireland departments which severely limits the scope for re-absorbing staff in this way. Various ways round this problem have been considered, including the possibility of taking staff into MSD on secondment, but no satisfactory solution has so far been found. Too much importance, however, should not be attached to this, which has not limited the ability of MS to recruit the right calibre of staff.

Training in MS

Although a lot is done by on-the-job training, formal training is also necessary to ensure that staff become proficient as quickly as possible in MS work. For this reason an in-house training programme has been devised in recent years which is attended by all new staff during their first three weeks or so in the division. This programme, which is believed to be unique in MS divisions in the United Kingdom, consists of a concentrated course conducted by experienced staff of MSD covering all aspects of O and M and which can therefore be considered to provide a reasonably comprehensive groundwork in the subject.

In the past the induction training was followed by attendance at the four week Civil Service College Foundation Course. It was found, however, that attendance at the course led to a certain amount of repetition and this, coupled with the cost of attending a course in London, raised the question of whether this training could be provided by some other means. For this reason, in 1978 the College agreed to mount a course in Northern Ireland which was specially designed to complement the in-house induction course. This was a two week course which contained a high proportion of role play and which was judged successful by both the trainers and trainees. Unfortunately it has not been possible to repeat this exercise, and consequently the following intake of staff attended a course run by a consultancy firm who designed the course to the specifications of MSD.

In addition to the above, attendance at short modular courses is encouraged in line with a comprehensive training programme that has been drawn up for the whole division so that staff can use these short courses for refresher purposes and to ensure they remain as up to date as possible.

The assignment factor

As suggested above, any consideration of the individual approach to MS must raise the question of whether assignments are geared to the greatest benefit of the service as a whole. The MS operation must

maximise resources and direct them into areas where they are likely to be most cost effective. One yardstick by which MS effectiveness can be assessed under the present system of operation is to look at the costs of the service compared to potential savings to be derived from assignments. In this connection it is important to emphasise that any savings estimate can only be made on the assumption that all recommendations will be accepted and implemented. As this is rarely the case such an estimate must be subject to an unknown margin of error. It is, however, of interest to note that in the financial year 1977/78 staff costs for major assignments were approximately £209,000 and the estimated savings were £1·4 million. The comparable figures for the financial year 1978/79 were £256,000 and £870,000 respectively.

Whilst savings in some departments were very small, the potential savings arising from some assignments were quite substantial. For example, an assignment was recently completed in which recommendations were made concerning the centralisation of supplies and stores organisations in the four Area Health Boards. In this case, if the recommendations are all implemented it is estimated that annual savings in the order of £667,000 could be realised over a period of several years. Another assignment was recently completed which investigated the possibility of the centralisation of the Government Training Centres Stores, and indications were that annual savings of the order of £180,000 could be achieved following implementation. This assignment was followed by the computerisation of stores procedures producing an additional estimated annual saving of £25,000.

Whilst financial savings can be quantified and identified as an outcome of the implementation of MS recommendations, the quantification of the outcome of MS activities in efficiency terms is by no means so clear cut and indeed is not always possible. It is well known that MS assignments do not always result in financial savings and indeed assignments should not be entered into with the preconceived idea that savings must accrue as part of the final recommendations. The philosophy behind the conduct of assignments should surely be that the primary function is to promote efficiency and any financial savings which arise, although they are very important in themselves, are secondary to this. For example, MSD made recommendations for the reorganisation of the eight former local education authorities into the present four area boards and have recently completed an assignment on the reorganisation of the Northern Ireland Housing Executive, which with a housing stock approaching 200,000 is probably the largest public sector housing authority in the United Kingdom. In neither of these cases were financial savings expected but the resultant effect on efficiency could well be appreciable.

Conclusions

The activities of MS in the NICS have gradually expanded since their inception. The concept of central MS can present inherent difficulties

in acceptance and implementation, but in the context of the NICS with its small departments, it is considered to be preferable to small departmental MS units. This arrangement ensures a more independent approach and makes for more objectivity in recommendations. It also allows a group of specialists to be deployed on each assignment, many of which, being major organisational studies, can have far-reaching consequences.

It has been seen that MS work can lead to significant financial savings. The importance of the early consideration of recommendations by departments leading to rapid implementation cannot, therefore, be over-emphasised if the maximum benefits in both financial and efficiency terms are to be realised. Nevertheless the pursuit of efficiency must remain its primary aim both in terms of the organisational structure of the central MS unit and of the type of assignments that are accepted and the priorities that are accorded to them.

The current unique Northern Ireland situation has no direct bearing on the operation of MSD. Staff are engaged on assignments which take them to all parts of the province. In the course of this work they move about regularly and in ten years of disturbances it is perhaps of interest that they have never encountered problems arising from civil unrest.

International Congress of the International Institute of Administrative Sciences

The XVIIIth International Congress of the International Institute of Administrative Sciences will be held at Madrid from 30th June to 4th July 1980. It will be preceded by preliminary conferences at Barcelona, on Administration and Regionalism; Madrid, on Integrated Budgeting Systems; and by a conference of the International Association of Schools and Institutes of Administration at Alcala de Henares. The preliminary conference will take place from 26th to 28th June 1980. Further information may be obtained from the International Institute of Administrative Sciences, Rue de la Charité, 25; B-1040 Brussels, Belgium.

To Count or Not to Count? Stocktaking by Random Statistical Sampling

By R M SMITH and M T R BLACKWELL, Ministry of Defence

Ralph Smith is a Principal in the Management Services (Organisation) Division and Dr. Martin Blackwell is a Senior Assistant Statistician in the Defence Statistical Systems Division of the Ministry of Defence. —*Editor.*

Recently the Management Services (Organisation) Division was asked to examine whether a standard system of stocktaking could be devised to replace the variety of methods which had grown up in each branch of the Armed Forces over the years. The study which followed involved a close partnership between O and M staff and statisticians, and enjoyed the keen interest and support of Supply Managers.

The stores inventory of the Armed Forces is pretty staggering: some 3,000,000 different, separately described kinds of equipment, ranging from tiny washers to large pieces of aircraft or machinery. Each description or 'item' is unique. An item may be held in stocks of thousands or just one or two. The current value of the inventory is well over £4,000 million.

The purpose of stocktaking

First of all, what is the purpose of stocktaking in the Public Service? Except for public organisations operating commercially or on a trading account basis, there is no requirement regularly to determine the value of stock held for the purpose of comparing changes in net worth. It is, on the other hand, essential to ensure that what the stock record says is on the shelf actually *is* there. The stock record is the means through which the Department or Authority controls the purchase and issue of stock so as to ensure on the one hand that the minimum amount is purchased and on the other that items essential to its function do not run out. The prime purpose of stocktaking in the Ministry of Defence, therefore, is to confirm the accuracy of the stock record.

It was important to clarify this point. In the course of a long and detailed study we examined the role of stocktaking not only within the Ministry of Defence but also in other Government Departments, national enterprises and foreign armed forces. We found that stocktaking was also used for other purposes, such as to determine that items

were actually located where they were supposed to be, that they had not been pilfered and that they had not deteriorated, evaporated or in any other way changed. Our first task, therefore, was to identify types of stores such as valuable or attractive items (watches, binoculars, etc.), items variously classified as 'useful to the ill-disposed', food and fuel, all of which for one reason or another needed checking in their own right and quite separately from any requirement to ensure that the stock record was correct. We felt that conventional stocktaking was an expensive and often not the most efficient method of regularly examining or safeguarding such items.

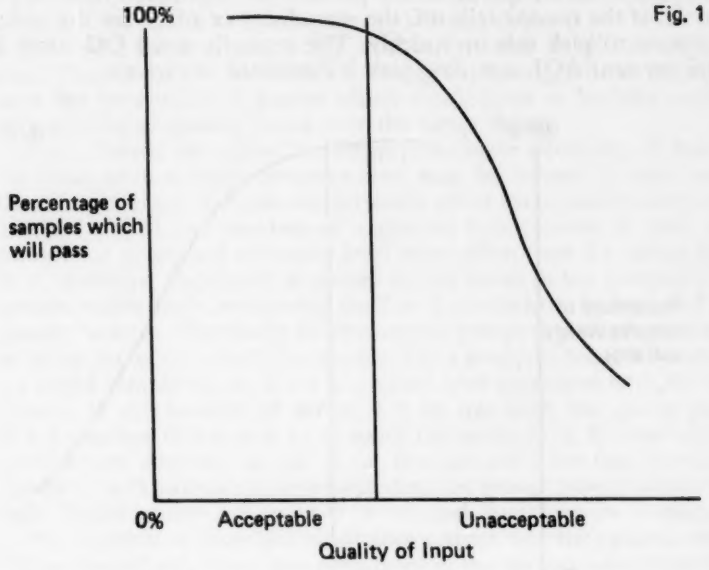
Current practice

So far as the great bulk of Defence stores was concerned, we found that for the most part stocktaking was done over a two-year cycle in which the entire inventory was examined, counted or surveyed, and the result compared with the record. Discrepancies were investigated to varying degrees and stock and record restored to balance. However, we found that the Royal Army Ordnance Corps, parts of the Naval Service and a sizeable portion of the US Supply Organisation operated systems of statistical sampling. These offered the advantage of economy of staff (full-scale counting is very labour-intensive) and allowed resources to be concentrated on areas where issuing or accounting procedures were bad instead of spreading them over all areas, good and bad. We concluded that such a system was the only practicable possibility for universal adoption over the United Kingdom Defence inventory. The random statistical sampling scheme we recommended was originally devised for production control purposes and is set out in detail in British Standard 6001. However, there are a number of important additional factors which need to be taken into account in the context of stocktaking and which we felt had not necessarily been fully assessed in any of the sampling schemes we had observed.

Production quality control by statistical sampling

Consider a manufacturer of tin cans. Each day large numbers of cans are produced, batched and sent to customers. If a batch contains a large number of defective cans, the customer is liable to return it to the manufacturer or, worse still, may place his orders elsewhere. The manufacturer, therefore, seeks to maintain a high standard of quality by regular maintenance of his production machinery. However, even in the best plants things can go wrong, and when they do it may not be immediately obvious: cans could be produced which are imperfect even though the machinery appears to be operating normally. One way of overcoming the problem would be to inspect every can produced but this, while certainly ensuring that all the cans sold are perfect (within the limit of the inspectors' human fallibility), is a very expensive process.

Instead of inspecting an entire batch of cans, it is possible to inspect a sample from the batch. If the sample contains a low number of defectives then the manufacturer can allow the batch to be sold without further ado because he is reasonably confident that the batch is of an acceptable quality. If the sample contains a high number of defective cans then he must withhold the whole batch and take urgent steps to ascertain the cause and put things right. Clearly the result of a sample failure is rather drastic so the manufacturer will want his sampling plan to be of such a nature that failures do not occur when quality is already acceptable, while at the same time any falling off in quality is detected very rapidly. In other words, his sampling plan needs to produce results on the lines of *Figure 1*.



A single sampling plan is of the form: take a sample of a certain size and if there is less than a certain number of defective items in the sample allow the batch to pass; if not, inspect the entire batch. Staff effort can be further reduced if a double sampling plan is employed. In this case a first sample is taken (which is much smaller than that of the corresponding single sampling plan) as a result of which the batch passes, fails or a second sample is required. If a second sample is required then the second sample results are combined with the first sample results to give a pass/fail decision.

How are the sample sizes and pass/fail figures chosen? For each plan the probability of a sample failing can be calculated if the quality of a batch is known. These calculations can be summarized on a graph which is called the operating characteristic (OC) curve of the plan. As we have said, the manufacturer's problem is to restrict the probability of failure when his quality is acceptable, and the plans in BS 6001 are accordingly devised on the basis that no more than 1 per cent of samples should fail when quality is good. This requires the manufacturer to decide what is meant by 'good', i.e. acceptable to his customers and capable of being maintained by his machines. This level of quality is termed the acceptable quality level (AQL) and, once determined, enables a plan to be selected. A plan with an AQL of 96 per cent, for example, will allow roughly 99 out of every 100 samples to pass when the quality of the product being sampled really is 96 per cent. If the quality falls off, the manufacturer will want the sampling process to pick this up quickly. The typically steep OC curve for a 96 per cent AQL sampling plan is illustrated in *Figure 2*.

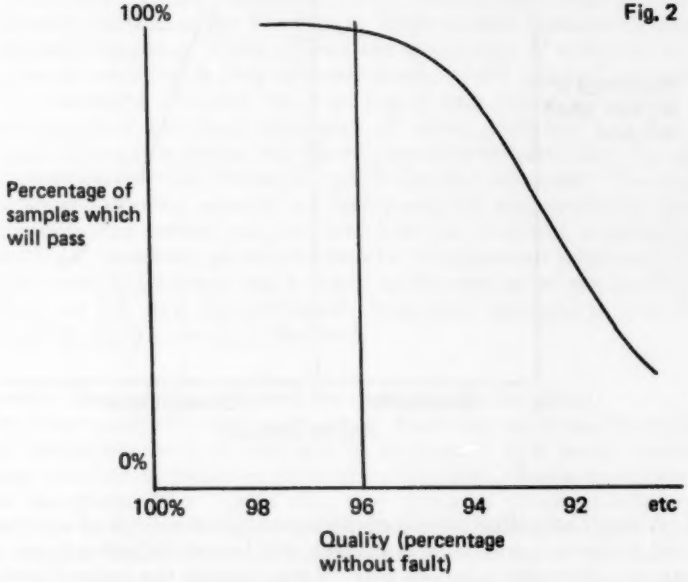


Fig. 2

Differences between stocktaking and production

As already explained, the prime purpose of stocktaking is to confirm the accuracy of the stock record. The 'quality' of the Supply Manager's product is the correctness of his accounts. For although he may deal in thousands of different items, his accounting procedure is likely to be

the same for most of them and its efficiency is what we are measuring. The question instantly arises, what is meant by 'correct'? The tin can manufacturer is allowed a certain tolerance in the dimensions of his product. Clearly a similar tolerance is appropriate for the stock record. Most errors in stock accounts do not mean that something has been lost or stolen, but simply that an incorrect entry has been made and one which will quite frequently be corrected in due course. So far in our stocktaking sampling scheme we have assumed that a discrepancy below £5 in value is not worth the staff effort and cost of pursuing, subject to the safeguard, for small items, that it does not exceed 10 per cent of stock held.

Similarities end here, however. The manufacturer can assume that his machines when working properly will produce a steady quality. The Supply Manager cannot: his machines are human beings. The effect can be significant, as *Figures 3(a) to 3(c)* show.

Note that the average quality level is the same in all cases, 96 per cent. The area of the box which is shaded in *Figures 3(b)* and *3(c)* represents the proportion of groups which would have to be fully counted when the input quality varies over the range shown.

Other factors can affect the Supply Manager adversely. If some of his items have a rapid turnover they may be subject to more errors than slow movers, and this can seriously affect his overall quality level. Similarly, if he has numbers of expensive items, errors in them may exceed the permitted tolerance level more often than for cheap items. It is, therefore, important to parcel up the items in the inventory into groups which have reasonably similar characteristics in terms of propensity to error. Our study recommended groups of 3000 to 5000 items as being the most cost-effective units. For a group of 5000, for example, an initial sample of 125 items is counted and compared with the stock record. If the number of errors is 7 or less then the group passes. If the number of errors is 11 or more the group fails. If there are 8, 9 or 10 errors, a second sample of 125 is taken and if the total number of errors in both samples is 18 or less then the group passes; otherwise it fails. Failed groups are counted in full and discrepancies investigated.

Factors such as those described above mean that the optimal sample failure rate of only 1 per cent postulated in the BS 6001 plans is unlikely to be achieved in stocktaking. Even so, if the sample failure rate rose to, say, 4–5 per cent, the scheme would still be very worth while and would greatly reduce the amount of counting which is currently being done, and thus the cost to the public purse. But what of the long term? Here we seemed to be venturing into uncharted waters since none of the sampling schemes we found being used for stocktaking had been running for more than a few years.

Long-term factors

An important point here is the difference between the respective 'outputs' of the stocktaking and production processes. In production, once

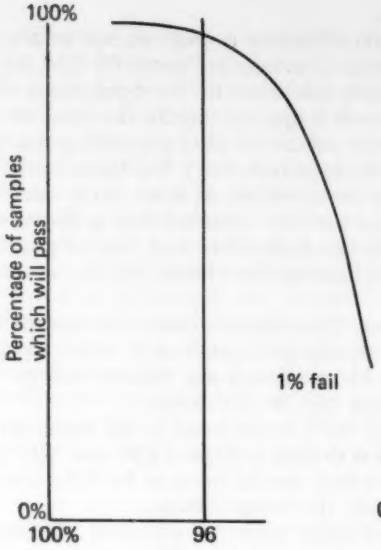


Fig. 3a

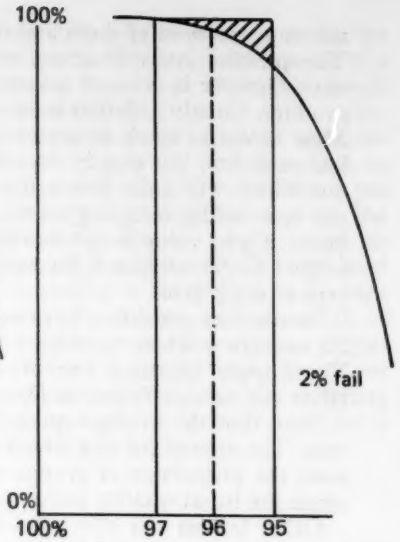


Fig. 3b

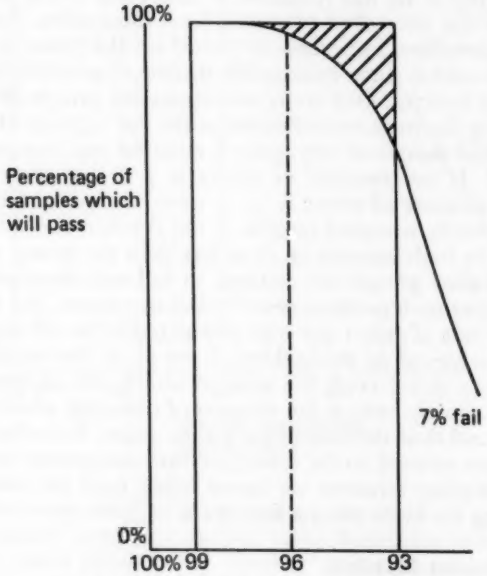


Fig. 3c

a batch has passed inspection it leaves the factory for ever. This is not so in stocktaking, where the 'product' (the account record) remains in use and is in effect recirculated within the system. Moreover, under statistical sampling most items are not actually inspected—indeed this is the whole point of sampling—and in the stockholding environment such items remain dormant within the system.

Since there is no such thing as an administrative procedure which is 100 per cent perfect, we know that every accounting system is bound to have an inherent liability to error, which means that each year a certain percentage of items will fall into error. When all the checks and corrective measures available to management have been applied, this residual error growth rate (the EGR) is a measure of the natural efficiency of the depot. We can see its effect in the context of statistical sampling by considering a depot of 100 groups with an EGR of 4 per cent per stocktaking period and examining the theoretical course of events when a sampling plan for an AQL of 96 per cent is applied.

Assuming that the depot accounts were 100 per cent correct at the beginning of the exercise, errors in them will have grown from 0 per cent to 4 per cent by the end of the stocktaking period. If, for simplicity, we assume that all the sampling is performed at the end of each period, then after the first stocktaking period the situation would be:

Error level and sample failure rate
(Number of samples expected to fail shown in brackets)

Period	Groups with error level growing from 0–4%	Groups with error level growing from 4–8%	Groups with error level growing from 8–12%	Total sample failures
1	100 (1)	Nil	Nil	1

At the end of the second period, one group (the single sample failure in period 1 which was therefore counted in full and corrected) again has a 4 per cent error level. The remaining 99 now have an error level of around 8 per cent. Put another way, this means that their quality level is 92 per cent and, since they are being sampled under a 96 per cent AQL plan, 65 of them will fail (remember the steep slope of the OC curve), as follows:

Period	0–4%	4–8%	8–12%	Total sample failures
2	1 (0)	99 (65)	Nil	65

In the third stage the 65 sample failures, which were all counted in full, would go back to square one; one group would move into the

8 per cent error category, and the remaining 34 would move into an average 12 per cent error where it is assumed that all would fail the sample test. The situation then would be:

Period	0–4%	4–8%	8–12%	Total sample failures
3	65 (0)	1 (0)	34 (34)	34

Over 8 periods the full table would appear as follows:

Period	Groups at 0–4%	Groups at 4–8%	Groups at 8–12%	Total sample failures	Outgoing quality (see para 22) (%)
1	100 (1)	0	0	1	98
2	1 (0)	99 (65)	0	65	96
3	65 (0)	1 (0)	34 (34)	34	95·2
4	34 (0)	65 (42)	1 (1)	43	95·3
5	43 (0)	34 (21)	23 (23)	44	94·8
6	44 (0)	43 (28)	13 (13)	41	95·2
7	41 (0)	44 (29)	15 (15)	44	95
8	44 (0)	41 (27)	15 (15)	42	95·2

The process can be illustrated graphically for difference EGRs as shown in *Figures 4(a)* and *4(b)*:

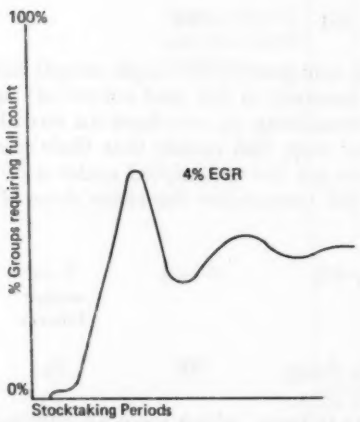


Fig. 4a

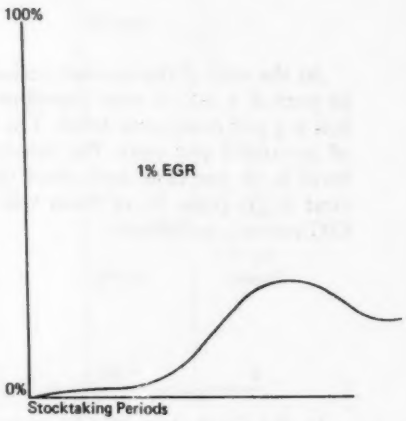


Fig. 4b

All curves of this type oscillate, which means that the counting workload—and hence the staff required for it—may vary considerably from period to period. Those with a low EGR are in a sense more sinister in that they give no warning in their early periods of the difficulties to come. A depot with a very low EGR (say ½ per cent) could survive for some 10 years requiring only a small number of full counts, then, when resources had been disposed elsewhere, could suddenly be faced with a requirement for a large number of full counts. All of these oscillations stabilise eventually, but curves with low EGRs take much longer to do so than those with high EGRs. As might be expected though, the long-term workload for depots with high EGRs will be higher than that for more efficient depots.

An interesting feature which can be mentioned here is that the final quality level of the accounts does not vary a great deal, as will be seen from column 6 of the table. Put simply, if there is a sub-normal quality input, the effect of the sampling scheme—at considerable cost, of course—is to require a large number of full counts which automatically restores the outgoing quality to something near the AQL of the plan. Nevertheless, the more efficient a depot is, the better its long-term out-going quality will be.

The next move

The trends described above in fairly simple terms have in fact been converted into mathematical models and calculated in considerable detail by computer; but the general pattern of progression remains the same. Bearing in mind that, as we have said, no stocktaking sampling schemes we observed had been running long enough to judge their long-term effectiveness, are we justified in proceeding with a scheme for the Defence inventory in the face of so many unquantifiable factors? We think the answer must be yes. Existing stocktaking methods are in large measure costly in skilled manpower. More than this, because of the wide variety of methods, including the degree of investigation and reconciliation, our study found that much of the work was unnecessary; still more, it created nugatory correspondence and administration extending back from depots to higher formations and computer centres. Our next step, therefore, is to conduct a carefully regulated trial at major supply depots of each of the three Armed Services.

These trials, which the Service Supply Managers are entering into with considerable energy and foresight, involve the introduction of stocktaking by the random double statistical sampling plan of BS 6001 with an AQL of 96 per cent over a fairly wide and representative section of the whole inventory, excluding valuable and other special items as described earlier. The results of the trials will be continuously monitored in detail, including a selected number of controlled groups, whose construction spreads across the whole of the trial area, in which the activity of every item will be monitored regularly. The trials themselves will enable us to answer a number of important questions:

(*a*) Whether fast movers have an unduly adverse effect on counting requirements and should be removed for separate full count or placed into separate groups; and how 'fast movers' should be defined.
(*b*) The effect of 'high cost' items, and how they should be defined.
(*c*) The effect of the rules for investigating errors which are found, and the action taken in reconciling them.
(*d*) Whether the definition of an 'error' is appropriate.
(*e*) Whether a plan with an AQL of 96 per cent should be used.
(*f*) How effective the sampling scheme is in pinpointing inefficient parts of a depot.
(*g*) Whether the length of the stocktaking cycle is still appropriate.

Finally, our control groups will throw important light on the elusive error growth rate, from which we can—with the aid of our mathematical models—project the likely counting load at a particular depot (or part of a depot) in future years, and take steps to prepare for it. With this long-term view of the project, we have made some initial studies of the effect on the mathematical models of allocating a predetermined fixed amount of manpower resources to the stocktaking task. Such resources would be excessive for the amount of counting required by normal sample-failures in the early stages of the kind of oscillating progression illustrated earlier but, if the spare capacity were used in 'easy' years to fully count selected areas even though samples from them had proved acceptable according to the plan, our model shows that the oscillations would be very considerably dampened and a situation of stability would be reached after relatively few cycles. This conceivably could be the eventual form of the MOD scheme on completion of the trials.

Book Review

The Mighty Micro: Impact of the Computer Revolution. By Christopher Evans. *Published by Gollancz, price* £5·50.

This is the first book on computers I have read that has held me from cover to cover. It has something of the pace and flavour of a good science fiction novel, but it holds attention primarily because of the quality of its exposition of contemporary developments and its ordered approach to possible future trends.

After dealing deftly and entertainingly with the history of computers and the principles on which they are based, Dr Evans develops a plausible account of the effects over the next two decades of the new technology that has been triggered off by the advent of the microprocessor. He envisages three stages: first, the dawn of public awareness of the new technological age; secondly, the beginnings of major changes in patterns of economic and social life; and thirdly, by the closing years of this century, political upheavals and the emergence of the Ultra Intelligent Machines or UIMs. The timing of these changes seems optimistic (or pessimistic?) and the account becomes more fictional as it goes along, but it is all good entertainment.

Perhaps the most fascinating part of the book is the discussion of the different elements of human intelligence and how these can be related to machine intelligence. This leads to the postulated emergence of the UIMs, and in the end these are seen as taking over a wide range of functions and even exploring the universe on our behalf. At that stage, one is left to wonder whether the UIM will be a Philosopher King or a Big Brother, but Dr Evans leaves it to us to dwell on such questions.

Current discussions about the micro revolution so often fail to take properly into account the constraining effects of market conditions and social structures. But there is a danger in over-reacting and talking too much in terms of a gradual evolution. The fact is that we are already well into a technological revolution, and the signs are that the end of the twentieth century will see changes taking place in the face of society quite as profound as those brought about by the Industrial Revolution, which similarly began with the mechanical developments of the second half of the eighteenth century. The principal differences this time will undoubtedly be that the changes, once they are under way, will develop more quickly and spread more extensively. Dr Evans' contribution is that he has been able to produce so wide a range of thought-provoking ideas on this subject, and it is indeed a tragedy that his recent death has removed such a powerfully questing intellect from the scene.

R. N. B.

Selections of articles

Readers may like to know that selections of articles which have appeared in *MSIG* are available from the Editor. Each selection covers a specific subject-area, for example:

Reducing Expenditure on Postal and Telecommunications Services; two articles; 24 pages; price 85p, including postage.

'Reducing Expenditure on Postal and Telecommunications Services' by A. Phillips.

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Requests for copies should be addressed to The Editor, Management Services in Government, Civil Service Department, Whitehall, London SW1A 2AZ. Persons and organizations outside the Civil Service should enclose with their order a cheque or postal order for the appropriate amount, made payable to 'Civil Service Department'.

New CSD Publications

This is a list of the documents recently issued by the Civil Service Department and its associated bodies. It includes material from the Central Computer and Telecommunications Agency, the Civil Service College, the Civil Service Commission, as well as from CSD itself.

These items may be examined in the Central Management Library, Civil Service Department, Old Admiralty Building, Whitehall, London SW1A 2AZ.

Unless otherwise stated, requests for copies should be sent to the Central Management Library, CSD, at the above address. HMSO publications may be ordered from PO Box 569, London SE1 9NH, from Government Bookshops, or through any bookseller.

Where no price is given, publications are free of charge.

Civil Service College Handbooks

The recent publication of *The Reports and Accounts of Nationalised Industries: a user's guide*, by Andrew Likierman (see page 55), marks the revival of a popular series of booklets published by the Civil Service College. Civil Service College Handbooks (which are a continuation of the previous series of CAS and Civil Service College Occasional Papers) are short expositions of concepts, techniques and information which are related to the training given by the Civil Service College, and are likely to be of help to civil servants in their work. They will also be of value to many people outside the Civil Service with an interest in management, administration and related subjects. The 20 titles in the Handbook and Occasional Paper series are obtainable from HMSO bookshops.

Auditing in Government
1979; 4 pp; ISSN 0141 8297.
Central Management Library reading list series A104.

Civil Service Department—its Organisation and History: a bibliography, compiled by M Y Keary and B M Howard
1979; 2nd ed; 49 pp; price £1.00; ISBN 0 7115 0012 6.

Guide to Flexible Working Hours
1979; 23 pp; price £1.00; ISBN 0 7115 0010 X.

Individual Assessment and Performance Evaluation of United Kingdom Civil Servants: a paper by D W Rayson
1979; 30 pp; price £0.50; ISBN 0 7115 0015 0.

Interviewing for Selection
1979; 2 pp; ISSN 0141 8297
Central Management Library reading list series A42.

Is My Office Safe?
1979; amended reprint; 22 pp; HMSO; price £0·75; ISBN 0 11 630223 2.

Legal Entitlements and Administrative Practices: a report by officials
1979; 20 pp; HMSO; price £1·00; ISBN 0 11 630425 1.

Recruitment Research Unit Reports:
Follow-up of the Administration Trainee Entry (reports 3–6), by D Mcleod:

No. 3: *The First Two Years at Work (1971–72 competitions)*
1979; 42 pp

No. 4: *The First Two Years at Work (1971–72 competitions): a multivariate analysis*
1979; 29 pp

No. 5: *The Effect of Job-Quality on Performance at Work (recruits from 1971–75 competitions)*
1979; 11 pp

No. 6: *Relationships between Educational Background and Success in the Competition (1973–75 competitions)*
1979; 9 pp

Plus *A Covering Note* (to the above reports)
1979; 4 pp

Short-Term Follow-Up of Direct Entry Principal Recruitment (1973–74 competitions), by D Mcleod and R Bayne
1979; 7 pp
Recruitment Research Unit Report No. 7

Staff Welfare in the Civil Service: a short guide
1979; 2nd ed; 19 pp; price £0·50; ISBN 0 7115 0005 3.

Typing Services
1979; 42 pp; HMSO; price £1·75; ISBN 0 11 630349 2.
Management Services Handbook
(Previously issued as a CSD departmental publication in 1975).

Central Computer and Telecommunications Agency
The journals are available from Mrs S Ross, Publications and Information Branch, Central Computer and Telecommunications Agency, Riverwalk House, 157–161 Millbank, London SW1P 4RT.

Government Computer Topics
Issue No. 22; October 1979.

Microcomputer Operating Systems
1979; 52 pp; HMSO; price £2·25; ISBN 0 11 630424 3.
Central Computer Agency Guide No. 10

Microcomputer Newsletter
Issue No. 5; November 1979.

Civil Service College
The Working Paper is available from: The Librarian, Civil Service College, Sunningdale Park, Ascot, Berks SL5 oQE.

Inner City Partnerships, by E. Craven
1979; 11 pp
Civil Service College Working Paper No. 15.

The Reports and Accounts of Nationalised Industries, by A Likierman
1979; 31 pp; HMSO; price £2·25; ISBN o 11 630426 X
Civil Service College Handbook No. 20
(Series formerly entitled Civil Service College Occasional Papers).

Civil Service Commission
The following items are available from Careers Information Division, Civil Service Commission, Alencon Link, Basingstoke, Hants RG21 1JB.

Administration Trainees in the Civil Service
1979; 14 pp; ISBN o 903741 50 4.

Civil Service Careers 1980: Degree level
1979; 20 pp; ISBN o 903741 52 0.

Civil Service Careers 1980: GCE/SCE level
1979; 12 pp; ISBN o 903741 51 2.

Report of the Committee on the Selection Procedure for the Recruitment of Administration Trainees (Chairman: F H Allen)
1979; 63 pp; ISBN o 903741 54 7.

Scientists: Civil Service Careers
1979; 3rd ed; 71 pp; ISBN o 903741 53 9.

Computer Installations for Government Departments

A list of all Government computers as at 1 January 1979 was published as a supplement to the May 1979 edition. Details of computers ordered during the period 1 July to 30 September 1979 are shown in the following table.

DATE OF ORDER	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1B Computers on order for administrative and general purposes				
July 1979	MOD (Navy)	Portsmouth	Production control information	CTL 8040
August 1979	MOD (Navy)	Devizes	Bureau work	ICL 2976
August 1979	MOD (Central)	Cheadle Hulme	Defence industrial pay system	ICL 2960/10
August 1979	MAFF	Guildford	Front end processor	GEC 40/85
August 1979	PWLB	London	Administrative processing of loans to local authorities	HIS M33
September 1979	MOD (PE)	Chertsey	Project management information system	HP 1000
2B Computers on order for scientific and technical purposes				
July 1979	MOD (PE)	Farnborough	Analysis of data	HP 1000
August 1979	MOD (PE)	Enfield	Preparation of payroll, design and development	ICL 2904
August 1979	MOD (Air)	Farnborough	Real-time control	Harris Series 500
September 1979	MOD (PE)	Chertsey	Simulation work	R & H AD10
September 1979	MOD (Navy)	Fareham	Training of artificers	Prime 550
September 1979	MOD (Air)	Bracknell	Outstation automation	Dual DEC PDP 11/60
September 1979	MOD (Central)	West Byfleet	To act as a bureau machine for the Establishment	ICL 2970 (second-hand)

[1], [2] Refer to supplement to May edition for Department and Manufacturer keys. Abbreviations for the following manufacturers are included for the first time: Harris—Harris Systems; R & H—R & H Applied Dynamics.

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13a Castle Street, Edinburgh EH2 3AR
41 The Hayes, Cardiff CF1 1JW
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Southey House, Wine Street, Bristol BS1 2BQ
258 Broad Street, Birmingham B1 2HE
80 Chichester Street, Belfast BT1 4JY

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